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FINAL PROJECT REPORT

The Central Coast Charge Ahead Project

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PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the CEC allocate up to \$20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational.

The Clean Transportation Program has an annual budget of about \$100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road and nonroad vehicle fleets to alternative technologies or fuel use.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce-training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued PON-13-606 to provide funding opportunities for development of a region-wide electric vehicle charger network. In response to PON-13-606, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards on April 2, 2014 and the agreement was executed as ARV-13-051 on June 30, 2014.

ABSTRACT

The Central Coast Charge Ahead Project installed 40 dual-port electric vehicle charging stations (78 ports total) in nine communities and 25 separate sites located in the tri-county Central Coast area (Santa Barbara, San Luis Obispo, and Ventura Counties). Communities engaged included the cities of Carpinteria, Buellton, Paso Robles, Arroyo Grande, Ventura, two leading Community Colleges -- Moorpark College and Ventura City College, and the Counties of Santa Barbara and Ventura. Two private site hosts (Treder Commercial Property in Santa Margarita and Decker Outdoor Corporation in Camarillo) were added to the project following the withdrawal of three originally programmed site hosts (the City of Santa Barbara, the City of Goleta, and the California State Parks – including Hearst Castle and Morro Bay.)

The purpose of project was to improve the availability of electric vehicle charging in publicly accessible locations -- thereby promoting the use of plug-in electric vehicles. The project investigated the effect of assessing fees to electric vehicle drivers for use of the charging stations as well as various fee structures. The project also tracked the process and cost of purchasing, installing, operating, and maintaining charging stations.

Site hosts were selected for the project based on strategic location and ability to commit to ongoing operation of the stations when the project is complete. ChargePoint supplied the charging stations at a 25 percent discount, providing a substantial element of the required matching funds. ABM supplied the installation engineering and labor. Each site host signed a Site Host Agreement prior to installation certifying their alignment with CEC program requirements. Each charging station supplied data that was analyzed by the EV Alliance for information on usage patterns.

Keywords: Electric Vehicles, Electric Vehicle Charging Station, Electric Vehicle Supply Equipment, Charger Management

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EXECUTIVE SUMMARY

The Central Coast Charge Ahead Project installed 40 dual-port electric vehicle charging stations (for a total of 80 charging ports) in nine communities and 25 separate sites located in the tri-county Central Coast area. Communities engaged included the cities of Carpinteria, Buellton, Paso Robles, Arroyo Grande, Ventura, Moorpark College and Ventura City College, and the Counties of Santa Barbara and Ventura. Two private site hosts (Treder Commercial Property in Santa Margarita and Decker Outdoor Corporation in Camarillo) were added to the project following the withdrawal of three originally programmed site hosts.

Objectives

The Central Coast Charge Ahead Project was designed to promote the increased adoption and use of plug-in electric vehicles by addressing three key challenges to the development of a robust electric vehicle ecosystem: 1) range anxiety; 2) charger siting optimization; and, 3) charge network sustainability. To address these challenges, the project identified sites in high-visibility, high-utilization commercial, workplace, and destination locations. The project team also encouraged implementation of a model use fee policy to ensure that electric vehicle supply equipment were utilized efficiently from the site host perspective yet economically from the driver perspective, and we assessed demand management strategies to help site hosts mitigate possible utility demand charges. In fulfilling the latter objective, we jointly developed a “demand management pilot study” in collaboration with our colleagues at the Bay Area Climate Collaborative/ Prospect Silicon Valley, which was lead agency on our sister project, known as the Bay Area Charge Ahead Project.

Methodology

Site Hosts included a combination of city and county agencies and private site hosts, were selected for this project based on established need, the ability to provide locations, commitment to continuing the operation of the stations when the project is complete, and the ability to pay for software licenses and additional installation charges (where necessary). ChargePoint supplied the charging stations at a 25 percent discount, which provided most the matching funding. ABM supplied the installation engineering and labor. To clarify mutual obligations, the project lead agency (California EV Alliance) led the collaborative development of a standardized Site Host Agreement signed by ABM and each participating agency prior to installation.

Data Collection

Each charging station supplied usage data via the ChargePoint network and a special ChargePoint account that provided anonymized usage monitoring. The data was collected and analyzed by California EV Alliance over a period of time to determine usage patterns and energy consumed by plug-in electric vehicles that used the system.

CHAPTER 1:

The Central Coast Charge Ahead Project

1.1 Problem Statement

Since the passage of AB 32, counties, municipalities, and regional public agencies have sought ways to reduce greenhouse gas emissions across all key sectors of the economy, especially the transportation sector, which accounts for approximately 53 percent of regional emissions. In support of these emissions reduction goals, the Central Coast Charge Ahead Project (CC-CAP) was developed to support build-out of a robust region-wide charging network for PEVs, aligned with the Plug-In Electric Vehicle (PEV) Readiness Plan completed under the oversight of the Central Coast Plug-in Electric Vehicle Coordinating Council.

1.2 Goals of the Project

The goals of the CC-CAP project were to:

- Develop a ubiquitous, convenient, sustainable, and well-maintained region-wide PEV charger network
- Reduce greenhouse gas emissions and improve air quality
- Increase market penetration of PEVs

1.3 Objectives of the Project

The objectives of the CC-CAP project were to cost-effectively achieve the following:

- Provide, install, and provision PEV charging ports in 20 key Destination Sites -- in locations that are easily accessible to the public, safe, well lit, well maintained, and likely to be well-utilized.
- Coordinate with local and regional agencies and site owners to support regional plans for PEV charging and integrate with California's network of existing and planned stations.
- Train and support site hosts on siting, Americans with Disabilities Act access, usage of station hardware and software, operations and maintenance, and pricing strategies to enable site hosts to generate adequate revenue to cover operations and maintenance costs, maximize station usage, reliability, and "up-time," and to ensure customer convenience.
- Track and measure station adoption and utilization rates over the duration of the project.
- Track and calculate equivalent greenhouse gas emission reductions, air quality improvements, and gasoline displaced by grant funding, with special reference to air quality in disadvantaged communities.
- Analyze usage trends to plan future station locations in the region based on siting principles and data in the Central Coast PEV Readiness Plan.
- Demonstrate utilization of Level 2 chargers in demand management applications that enable site hosts to minimize energy costs and manage grid impacts.

1.4 Prime Contractor

The EV Alliance was the Prime Contractor for the CC-CAP project. The Alliance was responsible for administration, reporting and invoicing, data collection and analysis, providing site host personnel training, and this final report. The Alliance provided coordination between the Major Subcontractor and the Site Hosts.

1.5 Major Subcontractor: ABM

ABM was chosen to be the Major Subcontractor for the CC-CAP project. ABM is a ChargePoint distributor, reseller, and installer. ABM provided the charging stations, site engineering, installation, and commissioning of the charging stations. ChargePoint, the manufacturer of the charging stations, provided a 25 percent discount on the stations, which was passed through by ABM to the project in the form of matching funds. ABM also provided matching funds in the form of reduced maintenance pricing and warranty costs.

1.6 Site Hosts

Site Hosts – including public agencies and private entities – provided the locations for the charging stations to be installed, shown in Table 1. The Site Hosts were identified prior to the grant award based on the need for charging stations, available locations that met the objectives of the grant, and commitment to provide necessary permits and funds to operate and maintain the charging stations for the duration of the project. Although locations were specified prior to the grant award, it was necessary to change some of the locations due to inadequate electrical service and/or prohibitively high installation cost and complexity. In addition, one City (Santa Barbara) required indemnification language that was not workable for the installation contractor and the gap could not be bridged. Table 2 shows a list of site hosts with withdrawn agreements.

1.6.1 List of Site Hosts, Lead Contacts, and Station Locations

Table 1: Site Hosts, Contacts and Locations

Partner	Contact	Site Name	Ports	Notes
City of Arroyo Grande	Kelly Heffernon	Le Pont Street Parking Lot Arroyo Grande	4	Photo #1
City of Paso Robles	Ditas Esperanza	Amtrak Parking Lot 800 Pine Street, Paso Robles	4	Photo #2
Ventura City College	Jay Moore	4667 Telegraph Road	4	Photo #3
City of Carpinteria	Erin Maker	Public Parking Lot – 5775 Carpinteria (Note that the City requested that the Amtrak lot receive two stations and the 5775 Carpinteria lot receive one station, which was agreed to by EVA)	2	Photo #4
		Downtown Parking Lot – 499 Linden	2	Photo #5
		Amtrak & Beach Parking Lot 475 Linden Avenue	4	Photo #6
		City Hall Parking Lot 5775 Carpinteria Avenue	2	Photo #7
Decker Outdoor Corp	Lance Lyons	3175 Mission Oaks Blvd, Camarillo	4	Photo #8
City of Ventura	Mary Joyce Ivers	Community Park & Aquatics Center 901 Kimball Road	4	Photo #9
		Beach Parking - 500 Harbor Blvd.	2	Photo #10
		City Parking #4 - 550 Santa Clara Ave	2	Photo #11
		Community Hospital - 77 Brent Road	4	Photo #12
Treder Commercial Property	Wes Treder	22450 El Camino Santa Margarita	2	Photo #13
County of Ventura	Jill Ward	County of Ventura Gov't Center 800 South Victoria Ave., Ventura	2	Photo #14
		Telephone Road Building County of Ventura Service Center 4651 Telephone Road, Ventura	2	Photo #15
		East County Courthouse 3855 Alamo Street, Simi Valley	2	Photo #16

Partner	Contact	Site Name	Ports	Notes
		Williams Drive Building County Services Center 1911 Williams Drive, Oxnard	2	Photo #17
		Vanguard Building County Services Center 1400 Vanguard Drive, Oxnard	2	Photo #18
		Todd Road Jail 600 Todd Road, Santa Paula	2	Photo #19
		Juvenile Justice Complex 4333 - 4353 Vineyard Ave., Oxnard	4	Photo #20
		Human Services Building 855 Partridge Drive, Ventura	2	Photo #21
		Fire District Headquarters 165 Durley Ave., Camarillo (not installed)		Cost prohibitive
County of Santa Barbara	Roy Hapeman	Isla Vista Solar Lot 884 Embarcadero Del Mar, Isla Vista	4	Photo #22
		Sheriff Parking Lot 4436 Calle Real, Santa Barbara	2	Photo #23
		Social Services Lot (not installed)		Cost prohibitive
City of Buellton	Angela Perez	City Hall	2	Photo #24
Moorpark College	John Sinutko	College Parking Structure 7025 Campus Rd	12	Photo #25
TOTAL			78	

Source: EV Alliance

Table 2: Site Hosts with Withdrawn Agreements

Location	Contact	Site Name	Reason for Non-Installation
Santa Barbara Airport	Victor Garza	Panama St	Indemnification language required by the City of Santa Barbara was not workable for the installation contractor (ABM)
City of Santa Barbara		Lot 10 Garage	
		Lot 11	
		Lot 13	
		Carrillo Commuter Lot	
		Cota Commuter Lot	
CA State Parks	Tom Kidder	Morro Bay (alternative site)	The park system was not able to process an approval for this site quickly enough to be installed during the project period.
Hearst Castle		The park system partnered with Tesla to electrify this site.	
Goleta	Cindy Moore	City Hall	Costs were prohibitive for these sites to move forward due to location of power supplies.
		Goleta Valley Community Center	
		Goleta Branch Library	
		Stow Grove Park	

Source: EV Alliance

1.7 Site Host Agreements

Each of the Site Hosts signed a Site Host Agreement with the Major Subcontractor prior to the installation of the charging stations. The Site Host Agreement set forth the terms and conditions for installing the charging stations. A sample copy of the Site Host Agreement is in Appendix A.

1.7.1 Site Host Responsibilities

- Provide the locations for the charging stations that met the objectives of the project in terms of public access.
- Provide building permits for installing the stations.
- Provide electricity for powering the stations and charging the electric vehicles.
- Procure software licenses required by the charging station manufacturer. The software gives the site hosts network access to each charging station to control user authentication, access fees, and usage data.
- Pay for out-of-scope installation expenses where needed to install in originally identified location – or provide alternative location within original cost parameters.

1.8 Installation

Once site locations were finalized and Site Host Agreements were completed, and permits obtained, ABM proceeded to install the charging stations. Following permitting, the installation of the charging stations typically required one to two weeks including commissioning of the stations. However, the entire installation process took nearly two years to complete due to these factors:

- Lengthy negotiation and review period for completion of many of the Agreements with city attorneys
- Identification of electrical capacity requirements and (in some cases) utility service upgrades
- Authorization of additional funds (in some cases where needed) to complete the installation process
- Permitting
- Identification of new sites (in some cases) due to cost and complexity issues associated with the initially chosen sites.

The Major Subcontractor worked with each Site Host individually and completed the installation at each site as it became available. Thus, many of the stations began operation early in the project while some were installed closer to the end of the project.

After each charging station was installed, commissioning was required. This process involved testing and connection (typically via cellular networks) to the ChargePoint Network. Once commissioned, the station was immediately available for use by the public.

1.9 Data Collection and Analysis

Each charging port provides usage information through the ChargePoint Network. The usage information includes a timestamp for plugging in, plugging out, energy consumed, and duration of energy delivery. Note that the duration of energy delivery does not necessarily correspond to the amount of time that the vehicle was plugged in. For example, a PEV may require only an hour of charging but may be plugged in for five hours.

ChargePoint provides access to the usage data through a web portal and a sophisticated report generation system. Under normal circumstances, data from the stations is available only to the owners of the stations. However, for the CC-CAP project a special ChargePoint account was created that allowed the Prime Contractor to aggregate data from all of the stations that were installed as part of the CC-CAP project.

CHAPTER 2:

Analysis of Electric Vehicle Charging Station Data

Summary of Sites and Data Analysis: The sites were diverse in nature – some were in municipal parking garages in dense downtown locations, some in suburban locations next to public transit, and some located in scenic parks or other leisure destinations. All locations were selected as having a potential for heavy electric vehicle (EV) charging demand, or were deemed important to build out a regional charging network that would give drivers confidence to drive to key “destination” sites that might not be expected to have heavy utilization but would provide important convenience (e.g., driving to Central Coast wine country with confidence of recharging at a more remote site.)

To inform future EV charging station projects, station usage was analyzed by time of charge, utilization, frequency of use by unique customers, and usage policies established by the site hosts. Since all charging stations in the CC-CAP were part of the ChargePoint network, it was possible to monitor them remotely. From the data available, we were able to draw insights into how planners can best select EV charging sites and how station managers can best set station policies.

Notable Findings

- Importance of pricing: When EV charging has a price, EV drivers are encouraged to move vehicles once charging is complete, thus freeing up the charging station for other users. Additionally, fees provide disincentives against “opportunity charging” – whereby the same users might otherwise take advantage of free charging as an alternative to home-based charging.
- “Parking only” tendency: In high-demand parking areas, measures need to be taken to prevent EV drivers from opportunistically using charging stations as parking spaces when no charge is needed.
- Typical charging station characteristics:
 - 30.2 charging sessions per month
 - ~1 uses per day
 - 9.3 kilowatt hour (kWh) delivered per use
 - 11.8 unique users per month

2.1 Methodology

There were 80 charging ports (40 dual port charging stations) installed in CC-CAP. A listing of the stations is included in Appendix A. Each of the listed stations was required to be connected to the ChargePoint network in order to collect usage data. The ChargePoint network has several functions, including user authorization, usage statistics collection and storage, and real-time monitoring and management. EV Alliance, with ChargePoint, created a special ChargePoint network account that allowed us to monitor the 62 EV charging ports in CC-CAP in order to collect and analyze usage data.

Data collected included start/stop charging time, start/stop plug-in time, energy consumed, and price charged to the user. From the data, we were able to calculate lag times (difference between parking time and charging time), amounts of power that were delivered, occupancy

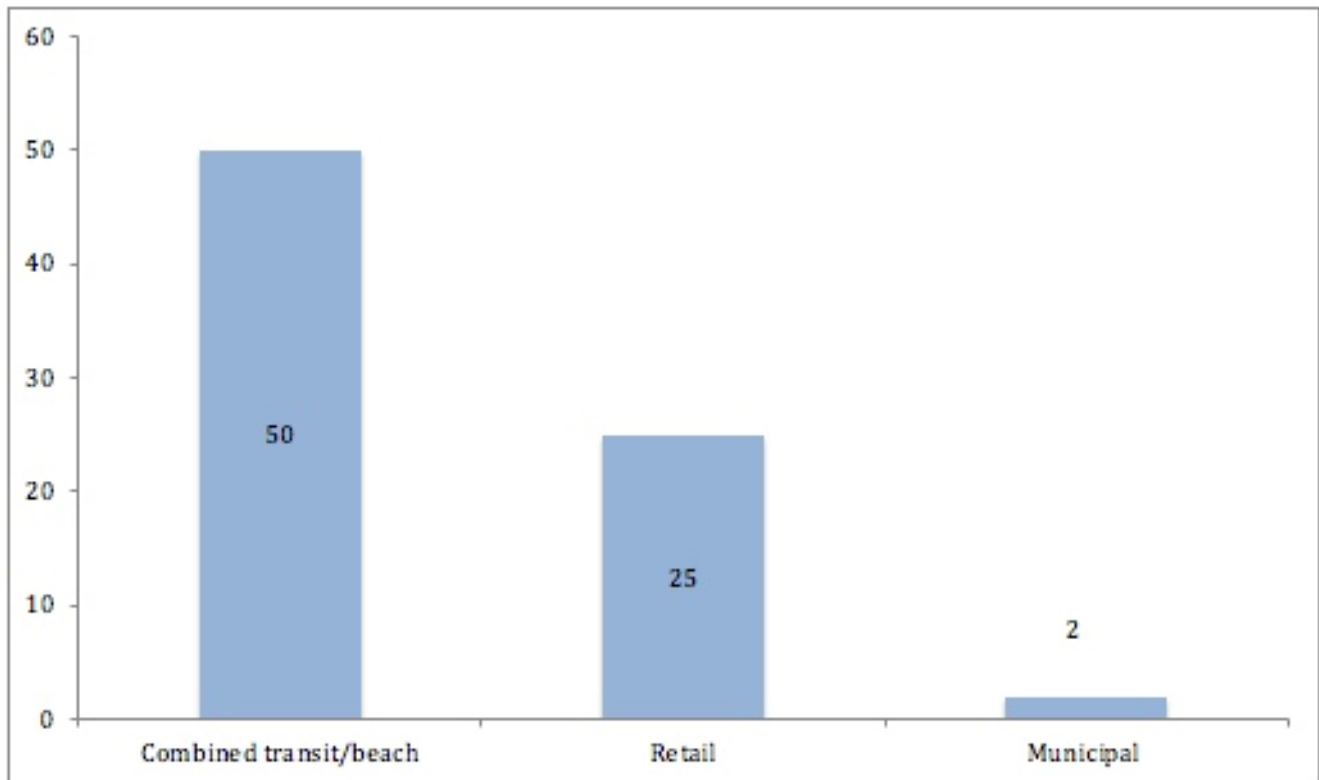
rates, and other factors. A sample of the raw data collected from the ChargePoint network is shown in Appendix B.

Not all charging stations in CC-CAP were installed and commissioned at the time this data was collected (August 2016 – whereas the project concluded in December 2016). However, the number of active stations was sufficient to provide guidance on usage trends.

2.2 Locational Impact on Utilization

Given that CC-CAP charging stations were installed in a wide variety of locations, including municipal parking areas, lots adjoining public transit, and parks and scenic destinations, wide variation was anticipated in utilization. Figure 1 shows the monthly usage of CC-CAP stations within just one municipality – the City of Carpinteria.

Figure 1: Total Number of Charging Sessions in a 30-Day Period, City of Carpinteria

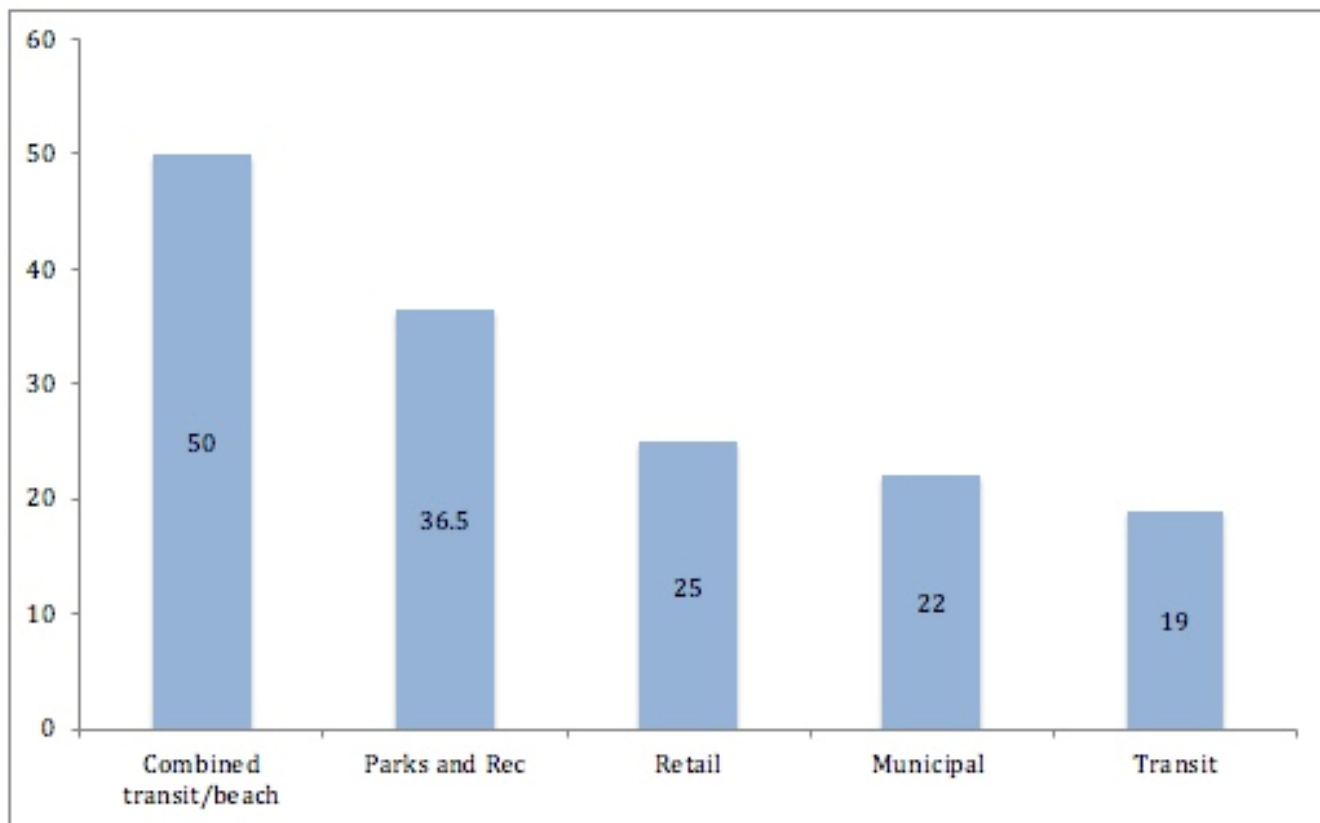


Source: EV Alliance

In the case of the City of Carpinteria, key non-locational variables remain the same. Each station is located within City limits, and each has two ports. The fee (\$.30/kWh) is the same across stations. However, usage varies 25-fold from the least used (two times per month at City Hall), to the most used (50 times per month), a charging station located in a parking lot adjacent to the Amtrak station that also provides beach access.

The discrepancy of usage by location is less extreme when viewed in the aggregate across the whole project than the example of Carpinteria, though clear trends exist. Figure 2 portrays the average monthly charges per station across all stations of that location type.

Figure 2: Average Number of Charging Sessions in a 30-Day Period, All CC-CAP Stations



Source: EV Alliance

While parks and recreation destinations have the second highest monthly instances of charging, parking areas serving transit connections actually have the lowest average instances of charging. The data available points to the conclusion that parking areas serving multiple purposes are more likely to have a higher instances of charging than those that only serve one purpose. However, a larger sample size would be required to draw definitive conclusions about the relationship between station location type and instances of charging.

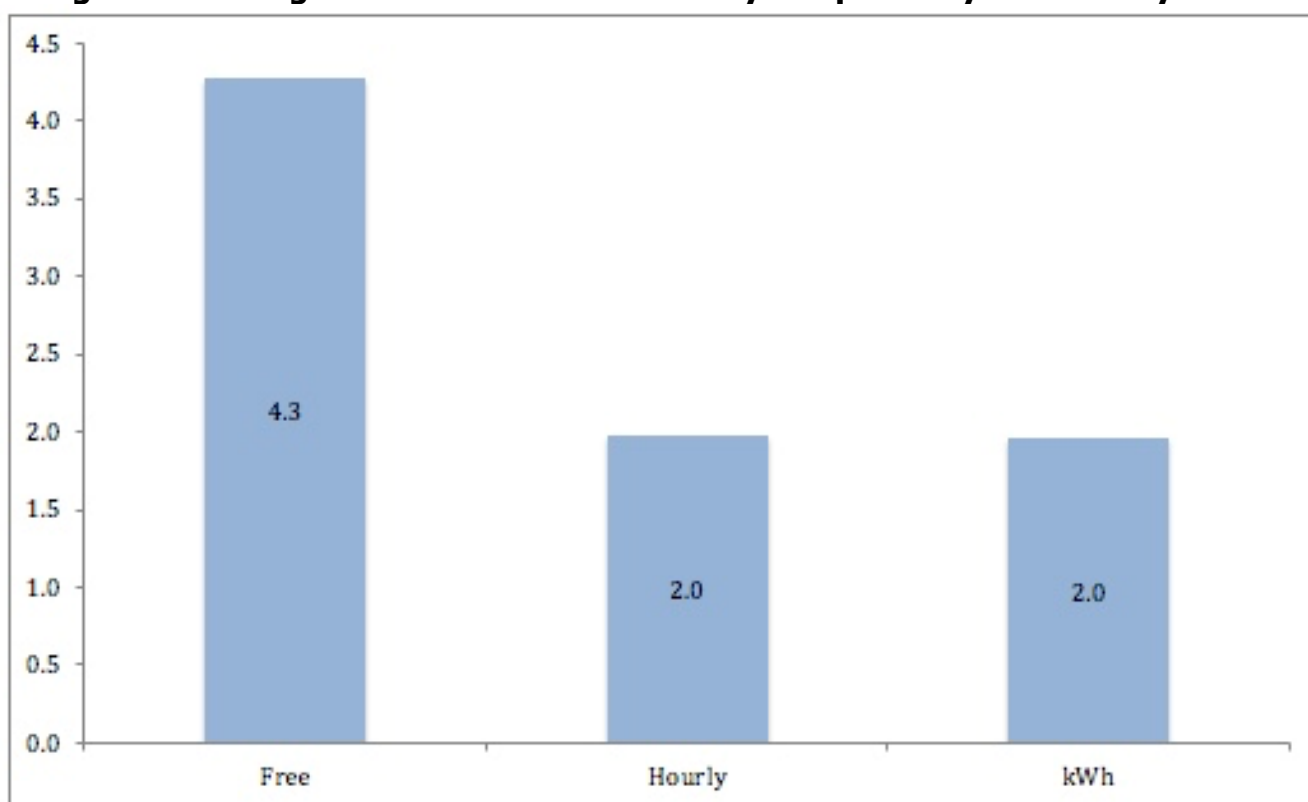
2.3 Pricing Policy Impacts on Usage

Participating agencies or site hosts were expected to devise a means to ensure that electric vehicles were moved to a different parking spot once charging was complete. The underlying purpose of this was to ensure that the charging stations were available to those most in need of charging and to encourage drivers to vacate stations when charging needs were satisfied. A secondary goal was to discourage electric vehicles that did not need to be charged from parking in an EV parking spot. In areas where parking is difficult to find, many EV drivers choose charging station equipped parking spots even though they do not actually need to charge their vehicles.

To accomplish these goals, it was recommended that the site hosts develop a policy to charge a fee for charging vehicles. The ChargePoint charging stations provide a simple and flexible means for the agencies to establish fees. Participating hosts generally set fees in one of two ways: a usage fee determined by kilowatt hours used, or a time-based fee determined by hours spent charging.

One site host was unable to incorporate fee-based charging and offered the chargers for free. While this did not have a significant effect on usage overall, it had a clear effect on usage by unique parties. As can be seen in the chart below, chargers offered for free attracted over twice as many visits by the same users as those offered for a fee, regardless of what fee structure was used. This indicates that users may be substituting free charging offered by the city for home charging. This not only shifts what is normally a private cost into the public sphere but could also potentially impact the availability of such stations for vehicles that actually need charging.

Figure 3: Average Instance of Station Use by Unique Party in a 30-Day Period

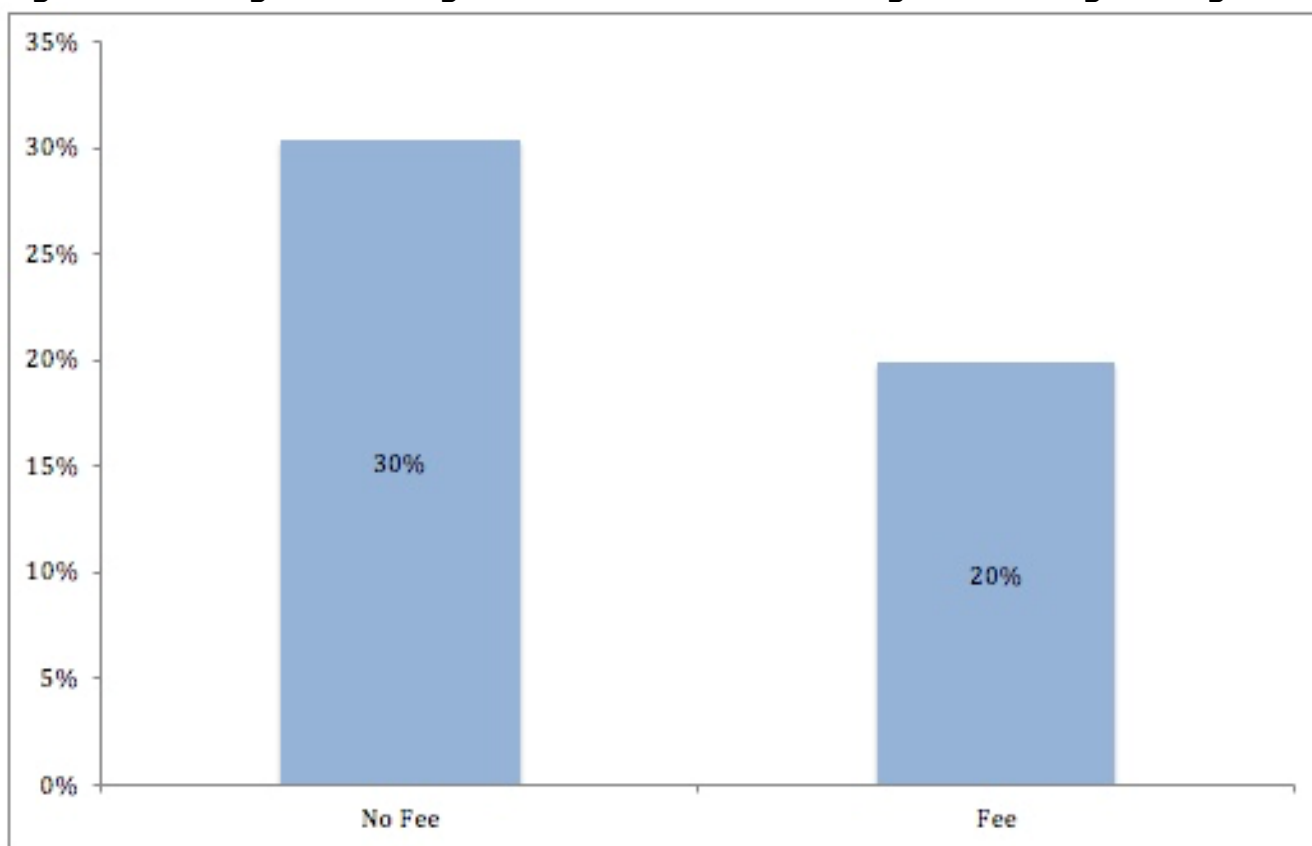


Source: EV Alliance

An additional benefit of charging fees is that it reduces the “lag time,” or time that an EV is plugged in and occupying a station without charging. The fee gives owners an incentive to not spend more time occupying a charging station than is needed for charging, which undermines the purpose of these public chargers.

Figure 4 shows the percent of total occupied time that consisted of “lag time” was 30 percent in stations without a fee, and only 20 percent in stations with a fee. There is a clear correlation between the existence of fees and the length of lag time.

Figure 4: Average Percentage of Individual Station Usage Consisting of “Lag Time”



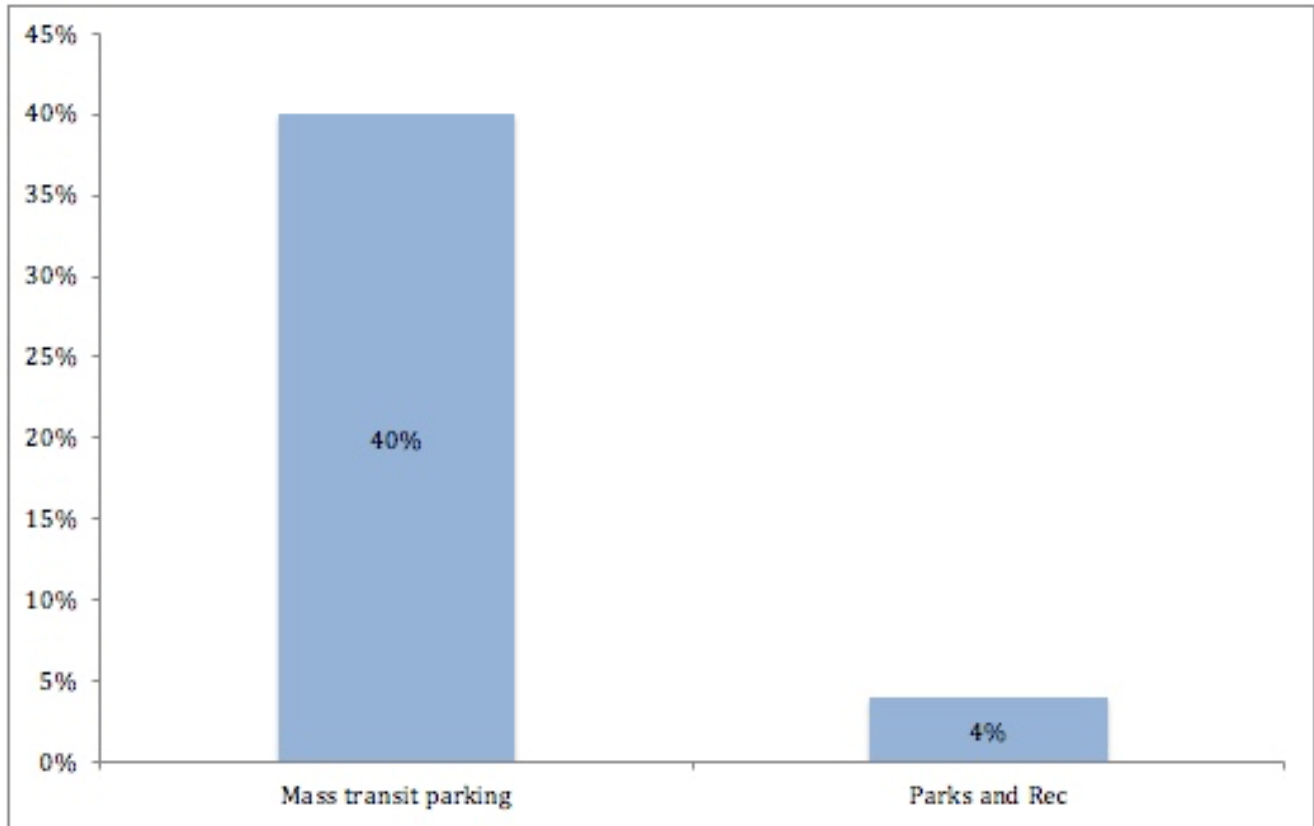
Source: EV Alliance

The data clearly show that charging a fee is beneficial as a disincentive for both “opportunity charging,” or EV owners substituting free public services for home charging as well as reducing “lag time.”

2.4 Instances of “Parking Only” Usage

Approximately 10 percent of all station occupancies were “parking only” uses, in which no charging occurred at all. In analyzing this, we focused on the stations that charge a time-based hourly fee, shown in Figure 5, as these are the subcategory in which drivers are presumably making a trade-off by parking in an EV site.

Figure 5: Percentage of Total Usages Consisting of “Parking Only” in Hourly Fee-Based Stations



Source: EV Alliance

Vehicle owners are ten times more likely to park in a fee-associated EV charging site without charging in parking areas that serve mass transit compared to those that serve parks and recreation areas. Potentially, this is because a mass transit location is generally used for “higher stakes” activity like commuting for work or travel, and drivers are more willing to accept a charge for parking. To ensure that charging stations are available to drivers in need of a charge, station managers could consider levying higher fees for parking *without charging* or penalize drivers who park significantly longer than required for their charging needs.

2.5 Profile of a Typical Station

One of the goals of CC-CAP was to document the usage characteristics of the typical EV charging station. For this analysis, we eliminated one station from the analysis due to extremely low usage levels and averaged the remaining usage statistics. Below are the usage characteristics for the “typical” charging port in CC-CAP (each charging station has 2 charging ports):

- Average sessions/month: 30.2 (~1/day)
- Average energy delivered per session: 9.3 kWh
- Average greenhouse gas savings per session: 3.9 kg
- Average charge time per session: 1.9 hours
- Average plug-in time per session: 2.6 hours

2.6 Conclusions

Pricing

Based on the analysis above, it is recommended that charging station property owners and/or host sites charge a fee for EV charging. By making EV charging fee-based, the EV driver is encouraged to move his/her vehicle after charging is complete, which frees up the charging station for other users. Additionally, it provides a disincentive against “opportunity charging:” the same users taking advantage of free charging as an alternative to home-based charging. This, again, frees up charging ports for those who need it.

Strategic Station Siting

Site selection can serve different goals. To maximize the amount of charges delivered to vehicles, stations must be located in dense areas and optimally in parking lots serving multiple purposes. To enable longer trips from the core areas and encourage EV adoption for people who live outside dense core areas, destination sites which will likely have lower utilization maybe appropriate.

“Parking only” Disincentives

Electric Vehicle Supply Equipment (EVSE) sites that reach customer-serving capacity during peak utilization times need to be particularly wary of EV drivers taking advantage of charging stations purely for parking access. While levying an hourly fee is a tool to mitigate this behavior, it may not solve the problem. Site hosts should consider additional penalties for drivers who occupy charging stations without utilizing charging services.

2.7 Charger Demand and Management Strategies

While the cost of charging station acquisition and installation was largely covered by the CEC through CC-CAP, property owners in the program were required to cover the cost of maintaining and operating the stations. Data collected from the property owners that are assessing charging fees show that the fees will cover the cost of Maintenance and Operation. To calculate average station operating costs and assess return on investment, EV Alliance partnered with our sister “Charge Ahead” projects and their sponsors, the California EV Alliance and the Bay Area Charge Ahead Project. Together, the three project sponsors selected a total of 29 stations in diverse site locations representative of deployments across the region. Table 3 shows the average station utilization and return on investment across 29 charging stations.

Table 3: Average Station Utilization and Return on Investment (sample size of 29 stations)

Connection Duration	9,570 Hours
Charging Time	6,406 Hours
Energy Delivered	12,436 kWh
Fees Collected	\$12,560
Estimated Electricity Cost (@ \$0.20/kWh) ¹	\$2,487
Maintenance Costs (service contract)	\$3,900
Estimated Net (Fees Collected – operations and maintenance)	\$6,173
Estimated annual net profit per station, before demand charges, if any	\$851

Source: EV Alliance

Costs and ROI for Stations NOT Charging Utilization Fees: Table 4 shows the average station usage and fee data for three organizations that are NOT assessing charging fees. (10 stations, 20 ports monitored between April 23, 2016 and July 22, 2016).

Table 4: EVSE Utilization & ROI for EVSE NOT Charging for Charging (sample = 10 stations)

Connection Duration	14,957 Hours
Charging Time	9816 Hours
Energy Delivered	53,053 kWh
Fees Collected	0
Estimated Electricity Cost (@ \$0.20/kWh) ¹	\$10,610
Maintenance Costs (service contract)	\$1,000
Estimated Net (Fees Collected – operations and maintenance)	-\$11,610
Estimated annual net loss per station, before demand charges, if any	-\$4,644

Source: EV Alliance

The communities that are assessing fees paid for all operating and maintenance costs and netted an estimated \$850 per year per station. The organizations that are NOT assessing fees had estimated losses of nearly \$4,644 per year per station.

Due to this finding it is recommended that site hosts assess a fee for charging electric vehicles. If charging stations incur a loss for the site host to maintain and operate, they may be abandoned in future years due to budget constraints.

¹ PG&E tariffs in use vary, however the most common tariffs are A-1, A6, A-10, and E-19 which offer a range of electrical costs from \$0.08 to \$0.54 per kWh based on time-of-use (TOU) and rate schedule. For purposes of the analysis a high estimated average cost of \$0.20/kWh was used based on actual rates charged during the analysis period. The calculations do not include demand charges which can vary significantly based on the total load associated with the meter serving the EVSE.

2.8 Profile of a Typical Station

Data indicates that most stations have four daily usage peaks: mid-morning, late morning, early afternoon and late afternoon. This suggests that:

- Peak demand charges are minimized through distribution of charging demand across the day – if there were a single peak it would likely be much higher which would cause higher demand charges;
- Fee-based charging is likely encouraging usage among a variety of use cases (fleet vehicles, shoppers and employees). Employees tend to charge when arriving to work (the first peak), shoppers charge throughout the day (second and third peaks), and fleet vehicles tend to charge at the end of the work day (fourth peak); usage of energy storage and solar energy would likely be an effective means to curtail facility and grid impacts of the charging stations, especially if implemented in tandem.

One of the goals of CC-CAP was to document the usage characteristics of the typical EV charging station. For this analysis we eliminated some of the stations due to extremely high or low usage levels and averaged the remaining usage statistics. Below are the usage characteristics for the “typical” charging port in CC-CAP (each charging station has 2 charging ports):

- Average sessions/month: 139 (4.3/day)
- Average energy delivered per session: 7.26 kWh
- Average greenhouse gas savings per session: 3.05 kg
- Average charge time per session: 1.76 hours
- Average plug-in time per session: 2.39 hours

Chapter 3:

Project Outcomes

The CC-CAP project lasted nearly three years during which time 40 dual-port charging stations were installed at 26 host sites. These charging stations added 80 Level 2 charging ports in publicly accessible parking lots and parking garages at 26 sites in the tri-County Central Coast Area. The project exceeded its goal by one charger (two ports). The vast majority of these stations are serving more than two charging sessions per day while generating sufficient income for the participating site hosts to continue operating and maintaining the charging stations indefinitely. A description of the project outcomes follows.

3.1 Provide, Install, and Provision of PEV Charging Ports in Key Destination Sites (Objective 1)

The project installed 40 charging stations (for a total of 80 ports) at 26 key locations. The site hosts determined the locations that would best serve their communities and customers. The users of the stations varied from community to community. In some cases, the users were people who needed to charge their vehicles while shopping, attending meetings, or going to appointments. In other cases, the users were employees who needed to charge their vehicles while at work. In a few cases, the charging stations are likely being used by residents who do not have access to a charging station at home.

3.2 Coordinate with Local and Regional Agencies and Site Owners to Support Regional Plans for PEV Charging (Objective 2)

The project coordinators worked with each community to find sites that supported the overall regional plan. Only one community (St. Helena) originally engaged in the program was not able to follow through on the provision of sites in their community. Sites in the City of Richmond were substituted when St. Helena was unable to perform. The regional plan called for substantial increase in the availability of Level 2 charging stations in publicly accessible parking lots and garages. The project focused on two key areas: 1) areas where the demand for charging was very high – typically downtown areas; and 2) destination sites in more peripheral locations (e.g. the Napa Valley) where EV drivers did not previously feel comfortable taking their EVs due to lack of charging facilities.

3.3 Train and Support Site Hosts (Objective 3)

Most of the site host communities had not yet installed EV charging stations in their garages and had little experience regarding issues such as Americans with Disabilities Act (ADA) access, usage of station hardware and software, operations and maintenance, and pricing strategies. The project held a series of training sessions in the form of webinars for the site hosts that covered these topics. In addition, the Major Subcontractor spent time with each site host to train them on remotely managing their charging stations. The result of these training sessions is that all site hosts are now able to manage their stations effectively. Using the ChargePoint network portal, site hosts are able to set pricing, monitor usage, and detect problems that the stations may be encountering. The experience gained during the installation enabled the communities to feel confident in moving ahead with additional charging stations as well as understand many key issues regarding signage, accessibility, and location determination.

3.4 Track and Measure Station Adoption and Utilization Rates (Objective 4)

The Prime Contractor set up a special ChargePoint Network portal to monitor all stations that are part of the project for usage. As a result of this ability, it was very easy to determine usage in terms of number of sessions per day, amount of energy delivered by each station each day, peak periods, and which stations were being underutilized.

3.5 Track and Calculate Equivalent Greenhouse Gas Emission Reductions, Air Quality Improvements, and Gasoline Displaced by Grant Funding (Objective 5)

The same special ChargePoint Network portal that is discussed in 3.4 above is used for determining total amounts of energy that is being delivered by the CC-CAP charging stations. Analysis of the energy data provides a basis for determining air quality improvements and greenhouse gas reduction based on the amount of fossil fuels that are displaced by electricity.

3.6 Analyze Usage Trends to Plan Future Station Locations (Objective 6)

The usage trends show that the dense downtown areas of the site host communities still have insufficient EV charging capacity. However, many site hosts discovered that they had insufficient electrical service to add more charging stations to the existing locations. The location of future stations will have to be planned around areas with high levels of electrical service or take advantage of emerging utility EV readiness programs. New or renovated parking garages should be constructed with a plan to add charging stations to a much higher percentage of the available parking spots than current garages can support. This will require a higher level of electrical service and – to reduce future installation costs -- pre-wiring parking spots to accept EV charging stations.

3.7 Demonstrate Utilization of Level 2 Chargers in Demand Management Applications (Objective 7)

This objective was only partially realized. The challenge encountered across the Central Coast Charge Ahead as well as the Bay Area Charge Ahead sister projects is that host sites could not support enough charging stations to engage in demand response programs managed by utility companies. On the positive side, demand charges were not an impediment to economical operation of the chargers. The Analysis section shows that average demand was very consistent throughout the day. Had there been very high peaks and low valleys in the demand over the course of a day there may have been more opportunity for developing demand management strategies. Importantly, the use of networked chargers provides the necessary communications channels to determine current use and to manage load in a smart charging environment.

Chapter 4:

Conclusions and Recommendations

Analysis of the data collected from the CC-CAP Project EV charging stations indicate that the Charge Ahead projects have been very successful. With only a few exceptions the charging stations are being highly utilized in terms of energy delivered and number of individual sessions per day. The benefit to the region is that more people can use EVs for their day-to-day driving. This in turn lowers the amount of fossil fuel used and substantially reduces greenhouse gases and other tailpipe emissions.

The following is a list of conclusions and recommendations based on the experience gained from CC-CAP.

4.1 Installation Process

The permitting process varied widely from jurisdiction to jurisdiction. In some cases, the permit process was very smooth but in others there was a longer process that required engineering documents to be provided before the permit was issued. Engineering documents can also represent a significant expense of several hundred dollars or more per site and can be a significant factor in adding unnecessary delay and site host cost. This lack of process and/or complex and time-consuming processes made it difficult to get the charging stations installed.

4.2 Pricing

Most of the host sites were initially in favor of not assessing fees for charging of EVs. The thought process was that free charging would encourage EV use and many communities who already had charging stations had been following this course of action. In this project it was discovered that assessing a fee for EV charging had several benefits:

1. *Encourages drivers to move their cars when it was complete.* This makes the charging station available for other EV drivers who need to charge.
2. *Encourage site hosts to assess fees for charging* to maximize availability to drivers actually in need of charging (and not merely in need of a parking space). The most effective fees are time-based fees (e.g.: \$1.00+ per hour) with an increase in the hourly amount after a period of time, usually 2-4 hours.
3. *Discourages drivers from using the charging station if their car does not need to be charged.* Many drivers will “top up” if there is no cost for using the charging station even when their car may not need to be charged to complete their trip. In areas that have parking shortages, EV drivers will use the EV equipped parking spot rather than a non-equipped spot due to availability unless discouraged from doing so by differential fees for parking. Assessing a fee will discourage this behavior and make charging stations available to those who need them.
4. *Provides funds for operation and maintenance.* Although electricity cost is low, charging stations have additional operating costs including network fees and maintenance costs and extended warranties. Funding maintenance and operation through usage fees provides an ongoing revenue stream to ensure that the charging station does not fall into disrepair or become the victim of budget cutting.

4.3 Installation Costs

CC-CAP assumed that the average cost to install a dual-port charging station would be about \$5,000. In nearly half the cases this was insufficient, and the site host community had to make up the difference. The average cost to install, including labor and miscellaneous parts and materials, was \$7,815.

One of the difficulties faced in installing EV charging stations is that it is nearly impossible to predict the installation cost of a specific station without doing an in-depth site survey to determine some of the variables such as distance from the panel, trenching, and available electrical service. This survey can require several hundred dollars of time by a qualified electrician or contractor. The CEC grant did not allow time or money to do this initial site survey, so an average installation cost was estimated. The lack of more comprehensive site surveys caused project delays and cost overruns.

4.4 Data Collection

Site usage data was easily accessed because the charging stations selected use a cloud-based application to control the stations as well as monitor usage. Historical data is available so that future projects can look at usage data from the beginning of the project up to the present time. This capability is essential to the success of the project as well as informing future projects.

4.5 Further Recommendations

1. Encourage lower-cost and streamlined permitting to minimize project complexity, cost, and time-to-completion. Some local governments have already streamlined the permitting process and treat EVSE in the same manner as any electrical appliance. In these cases, “over the counter” permits and self-inspection of finished work was typically accepted. In other locations, the permitting process required extensive electrical engineering documents that required multiple site visits as well as visits to the permitting agency and a final inspection before activation of the charging station.
2. Leverage cost sharing with public utilities to reduce installation costs to site hosts. In several cases there was insufficient electrical service to economically install the EVSE at originally identified host sites. In some cases, this resulted in charging stations being located in less desirable locations. The investor-owned utilities are now adding the cost of EVSE-related electrical service upgrades and pre-wiring to the rate base, which will provide funding to run service, conduit, and wiring to many charging station locations. Close coordination on site selection and funding by site hosts and intermediaries such as regional PEV Coordinating Councils will accelerate deployment of EVSE in highest-priority sites.
3. Encourage use of smart charging platforms and services, such as the eMotorWerks Juicenet platform and similar managed charging platforms and programs that are likely to emerge. As the electrical grid shifts toward renewables, and peak leveling becomes increasingly important to mitigate demand charges, EV charging will play an important part in balancing the supply and demand of electricity on the grid. A number of companies are pursuing smart charging pilots and operating programs with the utilities that will enable utilities and EV Service Providers to modulate charging within customer-defined parameters. These opportunities should be pursued by site hosts, utilities, EVSE OEMs, and other third parties.

GLOSSARY

AMERICANS WITH DISABILITIES ACT (ADA)—One of the most significant federal laws governing discrimination against persons with disabilities, passed in 1990. Prohibits discrimination against individuals with disabilities in employment, housing, education, and access to public services. The ADA defines a disability as any of the following: 1. "a physical or mental impairment that substantially limits one or more of the major life activities of the individual." 2. "a record of such impairment." or 3. "being regarded as having such an impairment."

CALIFORNIA ENERGY COMMISSION (CEC)—The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The CEC's five major areas of responsibilities are:

1. Forecasting future statewide energy needs.
2. Licensing power plants sufficient to meet those needs.
3. Promoting energy conservation and efficiency measures.
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels.
5. Planning for and directing state response to energy emergencies.

Funding for the CEC's activities comes from the Energy Resources Program Account, Federal Petroleum Violation Escrow Account, and other sources.

CENTRAL COAST CHARGE AHEAD PROJECT (CC-CAP)—A project worth half a million dollars funded by the CEC to install 40 dual-port charging stations throughout 25 sites in the tri-county Central Coast region.

ELECTRIC VEHICLE (EV)—A broad category that includes all vehicles that are fully powered by electricity or an electric motor.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)—Infrastructure designed to supply power to EVs. EVSE can charge a wide variety of EVs, including BEVs and PHEVs.

KILOWATT-HOUR (kWh)—The most commonly used unit of measure telling the amount of electricity consumed over time, means one kilowatt of electricity supplied for one hour. In 1989, a typical California household consumed 534 kWh in an average month.

PLUG-IN ELECTRIC VEHICLE (PEV)—A general term for any car that runs at least partially on battery power and is recharged from the electricity grid. There are two different types of PEVs to choose from—pure battery electric and plug-in hybrid vehicles.

Appendix A:

Site Host Agreement Template

Central Coast Charge Ahead Project 2 – Approval to Proceed

Table 5 shows a preliminary information form for installation of equipment at site host.

Table 5: Installation of Level 2 Electric Vehicle Supply Equipment

Date	
Site Host Entity	
Address of Site Host Entity	
Primary Contact Name & Title	
Primary Contact Phone	
Primary Contact Email	
Authorizing Official Name & Title	
Authorizing Official Phone	
Authorizing Official E-mail	

Source: EV Alliance

I. Project Summary

The Central Coast Charge Ahead Project is a multi-jurisdictional project led by the California EV Alliance to procure and install Level 2 Electric Vehicle Supply Equipment – a.k.a., EV chargers – in specified locations throughout the region. The project is funded by the California Energy Commission via the PON-13-606 solicitation award approved on May 14, 2014. Upon completion, the Central Coast Charge Ahead Project will install a total of 40 dual port Level 2 chargers, for a total of 78 Level 2 charge ports, including _____ **charging stations (with a total of ____ charge ports)** located in the **City of** _____ .

II. Purpose of this Approval to Proceed

This document provides the approval for ABM to ship and install the CEC-funded Level 2 charging stations at the approved addresses identified by the Site Host; and identifies for each of the relevant parties (the California EV Alliance, the Site Host, ABM, and ChargePoint) the roles, responsibilities, terms, and conditions for installation, maintenance, and operation of the charging stations.

III. Partner Roles

1. **The California EV Alliance** – a California nonprofit corporation, is the awardee of California Energy Commission grant support. California EV Alliance will provide overall

project management services, including contract oversight, fiscal administration, and reporting to the CEC. California EV Alliance has contracted with ABM for charging installation services, and with the Bay Area Climate Collaborative for project management support.

2. **Site Hosts:** Site hosts for the EV charging stations in the CC-CAP project include cities, counties and private site hosts.
3. **ABM**, a national leader in EV infrastructure and energy management services, will provide installation, commissioning, and maintenance services for the project charging stations, and will provide a portion of the required matching funds.
4. **ChargePoint** – a leading charging equipment manufacturer – will provide Level 2 networked chargers and network operating services, including payment processing, cloud-based charge station information services, and software upgrades.
5. **The Site Host Entity** will:
 - A. **Complete required California Environmental Quality Act documentation** specified by the CEC.
 - B. **Provide access to charge station locations in their jurisdiction** designated in the PON-13-606 application (or a suitable alternative in the event that the original site is deemed infeasible to install.)
 - C. **Provide all necessary permits for the project**
 - D. **Collaboratively identify the most appropriate location for the chargers within the designated site**, taking into account convenience for both the EV driver and other users of the facility, visibility, accessibility, and installation cost. (Please note that site cost guidelines are highlighted below in the Siting Requirements and Scope of Work sections.) In the event that a location preferred by the Site Host cannot be installed by ABM within the project budget, a new site will be selected which is responsive to the Siting Guidelines indicated below. The California EV Alliance will assist the parties in coming to consensus on final siting as needed.
 - E. **Provide charging station signage (per the requirements defined below) and striping (where needed to clearly designate the space for EV use).** A minimum of one sign per EVSE-equipped parking space is required by the California Energy Commission and California EV Alliance, which shall indicate that the space is “reserved for EV charging.” The relevant signage must comply with the Manual on Uniform Traffic Control Devices and California Vehicle Codes, ensuring that signs are high enough, easily visible, and provide clear and accurate information on parking and charging policies.
 - F. **Provide adequate electrical capacity** and any other items deemed necessary to complete the EVSE installation that are otherwise excluded from the standard ABM installation services as specified in the Siting Requirements and Scope of Work sections of this Agreement. Any such items or services, if needed, will be further specified in this agreement (following the joint site inspection by ABM and the Site Host). Additional items (if any) to be provided for by the Site Host shall be summarized below. Items (if any) that are contracted for with ABM for an additional fee are summarized in the form of a work order.
 - G. **Oversee installation with ABM**, and assign an administrative contact authorized to set up the ChargePoint online station management account before the stations are activated.

- H. **Contract with ChargePoint to provide charge station network operating services** during the 2014-2016 project performance period – as defined in the attached Master Software Services Agreement and in fulfillment of CEC local match requirements affirmed in the Site Host Letter of Participation included as part of the CEC PON-13-606 grant submittal. The ChargePoint Master Software Services Agreement needs to be “accepted” online as part of the EV station activation process after payment is made. As a reference, a copy of the ChargePoint Master Software Services Agreement is attached below in this document.
- I. **Maintain public accessibility for all chargers** on a 24/7 basis.
- J. **Maintain stations in good operating condition** during the 2014-2016 project operating period.
- K. **Operate the chargers in compliance with a *Site Host Pricing Policy*** that meets grant requirements defined in the California EV Alliance response to PON-13-606 and summarized herein.

IV. Siting Requirements

ABM will install Level 2 ChargePoint charging stations at the designated sites identified through collaboration between the Site Host and ABM. In the event that these sites are deemed by ABM to be cost-prohibitive, or pose other obstacles to effective installation, maintenance, or operation, a new site will be identified that meets the selection criteria identified by the CEC and by the California EV Alliance, and which is mutually satisfactory to the Site Host, CEC, California EV Alliance, and ABM. Alternatively, the Site Host may choose to perform or contract additional services as outlined below in Section V/Additional Services:

- **Location:** Select a high-demand, high-visibility location that conforms to CEC criteria for safety, ease of access/ingress, shelter, lighting, and ADA access.
- **Electricity:** Select a location where Alternating Current Level 2 (240V/40A) electrical supply is or can be made available with relative ease and minimal cost. (Note that the average cost of installation is projected at a market value of approximately \$4500 per site, which will limit panel upgrades and conduit runs.) More cost details are available in the ABM Scope of Work (Section V).
- **Equipment Protection:** EV chargers should be placed where they can be best protected from physical damage by such measures as curbs, wheel stops, setbacks, bumper guards, and concrete-filled steel bollards, while simultaneously taking into consideration ease of access to the charger, mobility of users, and foot traffic in the area.
- **Public Safety:** Chargers should be located in areas with proper ventilation and away from potential hazards including traffic, explosive materials, flammable vapors, liquids and gases, combustible dust or fibers, materials that ignite spontaneously on contact with air, flood-prone areas, and areas that might be prone to vandalism.
- **Duration of Use:** Alternating Current Level 2 charger sites should focus on locations where PEV owners will be parked for significant, though shorter, periods of time (e.g., one to six hours).
- **Shelter:** When possible, choose locations with nearby shelter to protect users from weather when connecting their vehicle to the charger. (However, chargers are designed to be safely operated in exposed locations in the rain, with no danger of electrical shock.)

- **Accessibility:** To the extent feasible, EV charger locations within a site will be accessible in accordance with the draft Governor's Office of Planning & Research guidelines on ADA access.
- **Security:** Locations should be selected that are secure for users at all times of day and night and relatively secure from vandalism (e.g., in well-lit, well-traveled areas.)
- **Cell Coverage:** Chargers require cell phone signals for networked operation and repeaters may be installed to provide signals if the site does not have coverage.

If no qualifying site is identified within the Site Host jurisdiction that satisfies the requirements of all parties, then the California EV Alliance, with the concurrence of the California Energy Commission, may propose a new site in another jurisdiction.

V. ABM Scope of Work

Under contract with the California EV Alliance, ABM will provide the following installation and related services at designated Site Host locations:

- Turn-key EVSE installation project management
- Delivery, installation and activation of ChargePoint stations
- Site analysis, station placement recommendation (in collaboration with Site Hosts), engineering, and installation management
- Quarterly maintenance (see description herein)
- ChargePoint warranty support
- Provide proper insurance and liability coverage information to Site Hosts as per standard contractor requirements.

ABM installation services funded by the CC-CAP program will be provided within the parameters outlined below for each Site Host. All chargers in the program are ChargePoint dual-port Level 2 stations (see illustration below). Station configuration and installation profile options are listed below:

- **Wall-Mount vs. Pedestal-Mount Configurations:** ChargePoint CT4023 Wall-Mount OR CT4021 Bollard-Mount units will be provided as appropriate to siting circumstances. Please note that the "bollard-mount" units are also interchangeably referred to as "pedestal mount." These units are NOT to be confused with *protective bollards*, which are separate devices such as a metal or concrete pole or blocking device, which may be installed separately to prevent damage to the charging station.
- **"Gateway" vs. "Drone" Charging Station Models:** Each ChargePoint CT 4000 series model is available as either: a) a "Gateway" unit, which includes the internal cellular communications equipment to connect to the public network; or, b) as a "Drone" unit that wirelessly communicates to the Gateway when installed within appropriate proximity and line-of-site locations. Multiple Drone units are typically added near one Gateway unit to form a multi-station charging group or array. Note that slight variations in the maximum length of conduit indicated in the scenarios below (Options 1-3) may be accommodated in limited situations at the sole discretion of ABM and California EV Alliance. Standard installation options include:
- **Installation Profile Option #1: Surface Mount Installation**
Install Pedestal ("Bollard") or Wall-Mounted dual charging station on existing concrete with anchors. Two (2) 40 Amp Standard Circuit Breakers will be provided and installed in existing electrical panel with available space and

amperage. Two (2) 60 Amp Disconnects will serve as local disconnecting means. A maximum of eighty (80) feet of ¾" Electrical Metallic Tubing surface mount conduit and wire will be provided and installed.

- **Installation Profile Option #2: Underground Installation**

Install Pedestal ("Bollard") dual charging station on new concrete base.

One (1) new concrete base will be constructed per charger. Two (2) 40-amp standard circuit breakers will be provided and installed in existing electrical panel with available space and amperage. Two (2) 60 Amp Disconnects will serve as local power disconnecting means. A maximum of forty-five (45) feet of underground trenching in planter and ¾" PVC underground conduit and wire will be provided and installed from existing electrical panel to new concrete base.

- **Installation Profile Option #3: Partial Surface and Underground Installation**

Install Pedestal ("Bollard") dual charging station on new concrete base.

One (1) new concrete base will be constructed. Two (2) 40-amp standard circuit breakers will be provided and installed in existing electrical panel with available space and amperage. Two (2) 60 Amp Disconnects will serve as local disconnecting means. A maximum of forty (40) feet of ¾" Electrical Metallic Tubing surface mount conduit and wire will be provided and installed onto the existing structure with straps in surface mounted configuration -- and a maximum of up to twenty-five (25) feet of underground trenching will be provided in planter and ¾" PVC underground conduit and wire will be installed from structure to new concrete base of EVSE.

- **Additional ABM or Site Host Provided Services**

- a) The Site Host may also opt to self-perform additional scope beyond Installation Profile Option #1, #2, or #3. This additional scope, if needed, is referenced in this document.
- b) If upon the site survey conducted by ABM, it is determined that there is additional required work beyond the scope detailed in Installation Profile Options #1, #2, or #3 above, ABM will provide an additional estimate for costs to complete the EVSE installation.
- c) In the event that the Site Host's site does not have sufficient electrical infrastructure to support the addition of EV charging infrastructure, ABM may offer options or potential solutions that would help reduce or balance current electrical loads within a facility. Some options are designed to free up electrical capacity while others are designed to minimize peak load spikes and their resulting demand fees. Any such solutions will be implemented only upon Site Host approval.
- d) In the case of additional services by either party, ABM will cooperate with the Site Host to coordinate satisfactory completion of the installation of the EVSE pursuant to the requirements of the project.

- **ABM Exclusions and Qualifications**

Unless specifically noted otherwise:

- a) Electrical design work to accommodate non-standard configurations is excluded and will be charged as additional as required, with agreement of Site Host.
- b) Electrical permit, plan check fees, and utility charges are excluded and must be paid by Site Host where required.

- c) Pricing is based on existing electrical system having adequate physical space and amperage available.
- d) Excludes any underground work such as excavating, concrete or asphalt cutting and patching.
- e) Excludes cellular signal booster for equipment without adequate cellular connection.
- f) Excludes concrete coring of walls, floor, ceiling of building or parking structures
- g) Excludes x-ray or radar detection of concealed obstacles within a concrete slab in either a post tension slab or rebar supported slab.
- h) Excludes protective barriers i.e. post barriers (bollards) or wheel stops.
- i) Excludes pull boxes or intermediate junction boxes for primary electrical feeds to EV chargers or any low voltage or signal wiring.
- j) Excludes landscape repair or restoration.
- k) Excludes any cosmetic enhancements such as paint or parking lot striping.
- l) Excludes any parking lot, access ramp or access path re-configuration or leveling that may be required to create ADA accessible spaces.

VI. ABM Warranty, Installation Services, and Limitations

- **Warranty:** ABM labor and construction material are under warranty for one year after installation; all new work is done to local National Electrical Code requirements. ABM is not responsible for the condition or capacity of the existing electrical systems. ABM is not responsible for any vandalism that occurs during or after the installation of materials. The cost of City permits and electrical engineering and engineered drawings (if applicable) are not included as part of the CEC-funded installation, although regular construction drawings are included. The CEC prohibits use of its funds for permitting. Local site hosts must cover permit costs.
- **Signal Boosting Equipment:** At times, signal boosting antennae may be required for the wireless features of ChargePoint EV charging stations to function properly. Due to the nature of wireless signals, possible interference, line of sight obstructions, etc., one or more antennae could be needed. During the original site visit, ABM will make efforts to determine the need for signal boosting equipment and will provide such equipment to the extent feasible within the overall project cost framework. However, it is possible that supplementary signal boosting equipment may be needed in the future. If the need should arise, or if the cost exceeds what is feasible within the CEC grant cost parameters, a proposal can be provided for signal boosting equipment.
- **ADA and Accessibility Requirements:** All ADA requirements determined by municipal or state agencies are the responsibility of the Site Host. ABM is responsible for the installation of the electrical system(s) necessary to the specific scope outlined for the EV chargers specified. It does not include surface modifications, striping removal, re-striping, etc. that may be necessary to comply with ADA or Accessibility Requirements. Also, any material changes to the electrical scope caused by ADA or Accessibility requirements are considered as additional to ABM services provided through CEC funding. The guidelines to be followed are the draft "[Plug-In Electric Vehicles: Universal Charging Access Guidelines and Best Practices](http://opr.ca.gov/docs/PEV_Access_Guidelines.pdf)" published by the State of California, Governor's Office of Planning and Research, at: http://opr.ca.gov/docs/PEV_Access_Guidelines.pdf. In the event that the state issues new guidelines prior to installation, the new guidelines will be used to define ADA requirements.

- **Wheel Stops and Bollards:** Reasonable measures will be taken to install stations in a safe location set back to avoid contact from vehicles. As noted above, protective bollards and wheel stops are not included in the standard ABM work scope. If additional protection is desired or required by the City, bollards or wheel stops can be procured and installed with the city's own resources or a proposal can be provided by ABM.

VII. ABM Terms and Conditions

- **INDEMNIFICATION.** ABM will defend, indemnify and save harmless the Site Host, its officers, agents and employees from any and all claims, demands, damages, costs, expenses (including attorney's fees), judgments or liabilities arising out of this Agreement or occasioned by the performance or attempted performance of the provisions hereof; including, but not limited to, any act or omission to act on ABM's part, or that of ABM's agents or employees or other independent contractors directly responsible to ABM, but only to the extent same are caused by the negligence, misconduct, or fault of ABM, ABM's agents or employees or other independent contractors directly responsible to ABM. ABM shall notify both the Site Host's Designee and Purchasing immediately in the event of any accident or injury arising out of or in connection with this Contract.
- **Contractor Access to Site:** The Site Host shall permit ABM ("Contractor"), free and timely access to areas and equipment, and allow Contractor to start and stop the equipment as necessary to perform required services. All planned work under this Agreement will be performed during Contractor's normal working hours.
- **Workmanship & Warranty:** Contractor warrants that the workmanship hereunder shall be free from defects for one year from date of installation. If any replacement part or item of equipment proves defective, Contractor will extend to Customer the benefits of any warranty Contractor has received from the manufacturer. Removal and reinstallation of any equipment or materials repaired or replaced not under a manufacturer's warranty will be at Customer's expense and at the rates then in effect.
- **Alteration to Scope of Work:** Any alteration to, or deviation from, the scope of work in this Agreement involving extra work, cost of material or labor will become an extra charge (fixed-price amount or on a time-and-material basis at Contractor's rates then in effect) over the sum stated in this Agreement.
- **Liability for Delay:** Contractor shall not be liable for any delay, loss, damage, or detention caused by unavailability of machinery, equipment or materials, delay of carriers, strikes, including those by Contractor's employees, lockouts, civil or military authority, priority regulations, insurrection or riot, action of the elements, forces of nature, or by any cause beyond its control.
- **Occupational Safety and Health Administration Provisions:** Site Host shall make available to Contractor's personnel all pertinent Material Safety Data Sheets pursuant to Occupational Safety and Health Administration's Hazard Communication Standard Regulations.
- **Toxic and Hazardous Substances:** Site Host's obligation under this proposal; and any subsequent contract does not include the identification, abatement or removal of asbestos or any other toxic or hazardous substances, hazardous wastes or hazardous materials. In the event such substances, wastes, or materials are encountered, Contractor's sole obligation will be to notify the Site Host of their existence. Contractor shall have the right thereafter to suspend its work until such substances, wastes, or materials and the resultant hazards are removed. The time for completion of the work

shall be extended to the extent caused by the suspension and the contract price equitably adjusted.

- **Damage Limitation:** UNDER NO CIRCUMSTANCES, WHETHER ARISING IN CONTRACT, TORT (INCLUDING NEGLIGENCE), EQUITY OR OTHERWISE, WILL CONTRACTOR BE RESPONSIBLE FOR LOSS OF USE, LOSS OF PROFIT, INCREASED OPERATING OR MAINTENANCE EXPENSES, CLAIMS OF SITE HOST'S TENANTS OR CLIENTS, OR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.

VIII. ABM Preventive Maintenance Program and Funding

The California Energy Commission requires that applications for funding under PON-13-606 "must include a maintenance plan for continued reliable operation and unforeseen breakdowns of the electric vehicle supply equipment." (Application Guidelines, p. 9) To fulfill this requirement, the California EV Alliance has negotiated a maintenance plan with ABM to cover Site Host charging stations for a two-year period following their installation. (Note that the formal term of the CEC project is anticipated to be from the date of execution of the CEC contract with the California EV Alliance through June 30, 2016.) To cover Year 1 of the project period, ABM will donate (as local match) the entire value of the maintenance plan based on its Manufacturers' Suggested Retail Price (MSRP), which is \$200 per charge port for the year. In Year 2, ABM will discount the Plan by 50 percent, providing \$100 per charge port as match, while CEC funds will provide the balance of \$100 per port to ensure continuity of maintenance across all charging stations in the Project. Table 6 outlines the funding commitments of ABM and the CEC:

Table 6: CC-CAP Maintenance Plan: Discount Pricing in Program Years 1 - 2

Program Year	Annual MSRP Maintenance Plan (per Charge Port for quarterly inspection)	ABM Local Match (50% discount for CC-CAP Quarterly Plan)	Site Host Contribution	CEC Funding	% Discount to Site Host
Year 1	\$200	\$200	\$0	\$0	100%
Year 2	\$200	\$100	\$0	\$100	100%

Source: EV Alliance

ABM Maintenance Scope of Work

- **Software Monitoring:** ABM will monitor on a daily basis the ChargePoint network software to detect failure modes and promptly address the problem, either through software adjustments or dispatch of a technician to the site, if authorized by the site host.
- **Software Upgrades:** ABM will work with ChargePoint to ensure rapid and seamless deployment of software upgrades.
- **Monitoring and re-programming of pricing:** ABM will assist Site Hosts in monitoring (and re-programming as necessary) their pricing approach to EV parking and charging services.
- **Monitor and report key EVSE data:** ABM will monitor and report key EVSE utilization data, including charge session frequency, length, energy utilization, and payment history.

- **Quarterly On-site Maintenance Scope of Work:** An ABM technician will visit Site Host locations in person on a quarterly basis to undertake the following maintenance activities:
 - **Maintain equipment finishes:** ABM will clean the display, head and pedestal/base unit with ABM Green Care cleanser and microfiber cloth; inspect and clean cord and J-1772 receptacle, apply cable protective Green Care coating, and clean aluminum and plastic parts with microfiber cloths and Green Care cleansers. (Note that ABM Green Care products are Leadership in Energy and Environmental Design certified for green maintenance processes.)
 - **Activate "ChargePoint" session** and perform visual inspection of electrical components and initiate the charging station self-test processes. Minor repairs and recalibration can often be done on site while technician is performing service to eliminate return trips and minimize down time of the equipment.
- **ChargePoint warranty repair work:** Charging station warranty related repair work will be processed through ChargePoint if such repairs are the responsibility of the manufacturer.
- **Non-Warranty work – option of pre-authorized work:** All non-warranty work such as vandalism repair or damage to EVSE equipment shall be estimated prior to repairs. At the option of the Site Host, this work could be immediately addressed under a "Not to Exceed" threshold of \$750.00 (or other amount) pre-approved by the site host. If authorized, ABM will perform work on a time and materials basis. Any agreement for pre-authorized repairs (if so desired) will be executed by ABM and the Site Host independently of this Authorization to Proceed.

IX. Network Services Fees

The ChargePoint network services fee is \$230 per year per port, and covers software upgrades, station programming, cellular connections, and 24/7 driver support. THE TWO-YEAR NETWORK SERVICES FEE MUST BE PAID IN FULL PRIOR TO THE COMMISSIONING OF CHARGING STATIONS. ABM will invoice the Site Host on behalf of ChargePoint and shall provide proof of Site Host payment within 30 days to the California EV Alliance in fulfillment of CEC project reporting requirements.

X. ChargePoint One Year Warranty and Optional Extended Warranty

The first year ChargePoint warranty is included free with all charging stations included in the Project. An optional extended warranty covers one or two additional years (parts only) for \$660 per Charging Station per year. ChargePoint equipment warranty details are provided in this document. If a Site Host wishes to extend the ChargePoint warranty, it must be specified at the time of equipment order and paid within 30 days.

XI. Site Host Pricing Policy Requirements

The California Energy Commission requires Site Hosts to implement a plan to optimize the use of the charging site to allow multiple EVs to use the charging equipment during a typical day, and to prohibit utilization of a charging station "beyond a reasonable period of time." In alignment with this goal, the Site Host shall implement the Pricing Plan identified in their Letter of Participation included in response to the CEC solicitation PON-13-606. The standard (default) Plan developed for all CC-CAP project participants calls for the following elements to be administered by the Site Host. (Note that variations from this Plan may be acceptable but must be approved by the California EV Alliance and included as part of this Notice to Proceed.)

- A. Fee-Based Charging:** Site hosts shall set charging rates between \$1.00 and \$1.50 per hour for use of the charger. This may or may not include separate charges for parking per the jurisdiction's usual parking policies. Fees may be calculated based on duration of stay, energy consumed, or a combination of the two.
- B. Graduated Pricing Based on Duration of Stay:** Site hosts shall raise the fee for occupying the EVSE-equipped space by a sufficient increment to encourage turnover of the space and thus greater availability and utilization (in charging mode) for EV drivers. It is recommended that this approach be implemented after approximately four hours of charging at the lower cost rate – particularly in cases where utilization rates are observed to be very high (70 percent or more) and available alternative charging facilities are limited. Site hosts may also consider a lower evening or weekend rate for EVs (similar to most existing parking policies) to encourage responsible off-peak use. (In particular, lots proximate to multi-unit residential buildings could provide a lower-cost overnight rate with a higher daytime rate that incentivizes overnight EVSE users to make way for daytime visitors and commuters.)
- C. EVSE Revenue and Cost Monitoring:** Pricing strategies should be reviewed on a semi-annual basis to ensure that expenses for sustaining charger operations are covered to the maximum extent feasible and appropriate. In most cases, fees for charger operations set in the \$1/hr. range (or equivalent kWh) should be adequate to cover energy costs, transaction fees, the ChargePoint network services fee, and (beginning with Year 3 of the Project) the (optional) continuation of the ABM Maintenance Plan. In rare cases where the charger is not yet being well-utilized, there may be a modest operating subsidy required.

XII. Disposition of Equipment: Charging stations and related equipment installed by ABM at Host Sites are considered to be the property of the Site Host upon delivery at the Site. Per CEC Terms and Conditions, the Site Host shall use the equipment in the project for which it was acquired as long as needed, and the Site Host shall not encumber the property without CEC approval. When no longer needed for the original project or program, the Site Host shall contact the California Energy Commission for disposition instructions.

Table 7 shows a summary of equipment and services provided under the agreement.

Table 7: Summary of Equipment and Services Provided Under This Agreement

[illegible]

Description	Cost
D. <u>Included</u> Two-Year ABM Cleaning and Maintenance Service ▪ (\$200 per year per charge port – included as local match)	\$
E. Optional: 2nd or 2nd/3rd Year ChargePoint Extended Warranty (parts only): (# of Charging Stations x \$660 per year x # of years = total price.) Note that the warranty is priced on the basis of charging <u>stations</u> rather than charging ports, i.e., a dual port charging <u>station</u> is \$660/year.	Paid by ABM
F. Additional (optional) installation or equipment upgrades specified below (including parts and services):	\$
Total Costs Paid by Site Host (sum of Sections C, E, and F above):	\$
	\$

Source: EV Alliance

Billing Information

Billing Contact Name: _____ Phone: _____

E-mail: _____

Authorization: We instruct **ABM Electrical Power Solutions, LLC** or subsidiaries to proceed with scheduling and performing the work described in the attached proposal.

Proposed date to begin work: _____

Host Entity Name (for billing and payment purposes): _____

Amount: (Insert "total costs paid by site host" itemized above): _____

Payment will be made to ABM by: (check one option below)

____ **Company check** before project start date: **Check number:** _____

____ **Purchase or Service order:** _____ **P.O. Number:** _____

____ **Credit or Debit card:** ____ Visa ____ Mastercard Other: _____

Card Number: _____

Billing Address: _____

Optional Additional Infrastructure Services Provided by ABM

Table 8 shows sample additional electrical upgrades and infrastructure services.

Table 8: Sample Additional Electrical Upgrade & Installation Infrastructure Services

<ul style="list-style-type: none">▪ Install _____ Wheel Stop(s)▪ Install _____ Protective Bollard(s)▪ Transformer _____ KVA▪ Wall Core Qty _____▪ Floor Core Qty _____	<ul style="list-style-type: none">▪ J - Box Qty _____▪ Trenching _____ ft▪ Concrete Cut/Patch _____ ft▪ Asphalt Cut/Patch _____ ft▪ Landscape Repair _____ ft
--	---

Source: EV Alliance

Description of Work to be Performed: _____

Materials List: _____

Materials \$: _____

Labor \$: _____

Tax \$: _____

Total \$: _____

Note: All work performed to local and NEC requirements by California State Certified Electricians.

ABM Electrical Power Solutions, LLC Terms and Conditions

The following items are in addition to Section VII – ABM Terms and Conditions within this CC-CAP Approval to Proceed document. Authorization to proceed with the work outlined in this quotation shall constitute Site Host ("Buyer's") acceptance of these terms and conditions in full. Oral authorizations to proceed must be confirmed to ABM Electrical Power Solutions in writing (Fax or e-mail) within 24 hours. If there is a conflict or discrepancy between terms and conditions in the Buyer's purchase authorization and this quotation, this quotation shall prevail unless specifically authorized, in writing, by ABM Electrical Power Services, LLC

Terms of Payment: **1.** Terms are net thirty (30) days. Any invoice not paid within thirty (30) days from the date of invoice will be subject to a service charge equal to the lesser of One and One-half percent (1.5 percent) per month on account balances or the maximum percentage permitted by law. **2.** At ABM Electrical Power Solution's option, customers may be invoiced on a monthly basis for services provided over more than one month. **3.** All pricing and payment terms contained herein are contingent upon a favorable Credit Report for the customer/client to whom this quotation is provided. Upon receipt of a less than favorable credit report ABM Electrical Power Solutions reserves the right to withdraw this proposal, modify the pricing, or require payment when services are rendered, or advance payment of the total job quotation before providing services. **4.** For material purchases in excess of \$50,000, ABM Electrical Power Solutions reserves the option to invoice 50 percent of the total at the time of material order and the remaining 50 percent at the time of material delivery. **5.** Customer agrees to pay ABM Electrical Power Solutions, to the extent permitted by applicable law, all costs and expenses, including but not limited to reasonable attorney's fees, incurred by ABM Electrical Power Solutions in connection with any collection activities or actions to collect unpaid invoices under this quotation.

Delays: ABM Electrical Power Solutions shall not be liable for delays or performance resulting from causes beyond its reasonable control, acts of God, acts or omissions of Buyer, fire, strike or other labor difficulty. Should there be a delay, the date of delivery or performance shall be extended.

Cancellation: Notice of cancellation of services to be performed must be received thirty-six (36) hours prior to the agreed upon date and time. Unless such notification is provided, charges will be incurred. These charges will be ABM Electrical Power Solution's cost plus ten percent (10 percent) and will include any rental equipment for the Project.

Disclaimer: ABM Electrical Power Solutions assumes no responsibility for any damage or injury to any property caused directly or indirectly as a result of ABM Electrical Power Solutions performing its duties under this agreement except such damage or injury that may be held to result solely and directly from or out of: Any grossly negligent performance by ABM Electrical Power Solutions in its obligations under this Agreement or any willful misconduct on the part of ABM Electrical Power Solutions, its agents or employees.

Responsibility: All services are performed in accordance with industry standards, project specifications and/or National Electrical Testing Association specifications. Where remediation is beyond the scope of normal reliability testing, and where corrective action is required, such services will be quoted separately.

Assignment: ABM Electrical Power Solutions reserves the right to assign this project in part or in total to an affiliated entity.

Termination: An order may be terminated only by mutual written agreement between Buyer and ABM Electrical Power Solutions and only upon payment of costs and expenses already incurred by ABM Electrical Power Solutions

Safety: ABM Electrical Power Solutions agrees to comply with all applicable federal, state, local, National Electric Codes and project safety rules and regulations. ABM Electrical Power Solutions reserves the right not to perform work that in its opinion violates Occupational Safety and Health Administration Electrical Safety-Related Work Practices; Final Rule or other safety rules and regulations.

Standby Time: When ABM Electrical Power Solutions service personnel are on the job site but unable to perform services requested because of circumstances beyond ABM Electrical Power Solutions control, the customer may be charged standby time at the applicable rate for each such ABM Electrical Power Solutions service person (up to a maximum of eight (8) hours per day per person).

Liability: ABM Electrical Power Services, LLC. and its contractors and suppliers of any tier, shall not be liable in contract, in tort or otherwise for damage or loss of property or equipment, loss of profits or revenue, loss of use of equipment or power system, cost of capital, cost of purchased or replacement power or temporary equipment (including additional expenses incurred in using existing facilities), claims of customers of Buyer, or for any special, indirect, incidental, or consequential damages of any kind, whether arising in or based on contract, tort, statute, strict liability, warranty or otherwise.

Warranties: All material and equipment delivered and/or installed will be the products of reputable manufacturers. ABM Electrical Power Solutions MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY EXPRESSLY EXCLUDED, CONCERNING MATERIAL AND EQUIPMENT MANUFACTURED BY OTHERS. ABM Electrical Power Solutions sells and delivers all materials and equipment not manufactured by it "AS IS," but ABM Electrical Power Solutions will use its best reasonable efforts to obtain from the manufacturer, in accordance with the manufacturer's customary practices, the repair or replacement of any material or equipment which may prove defective in workmanship or material. The foregoing shall be the exclusive remedy of Buyer and the sole obligation of AB Electrical Power Solutions with respect to material and equipment manufactured by others. Further, ABM Electrical Power Solutions warranties its labor for one (1) year.

Site Host Commitment to Perform Site Preparation Services

NOTE: This is needed ONLY if the Site Host and ABM mutually determine that additional services must be performed by the Site Host to enable successful installation of EVSE.

Project(s): _____

Site Addresses: _____

Site Addresses: _____

Site Addresses: _____

Site Host Contact Name & Title: _____

Site Host Phone: _____ **Site Host E-mail:** _____

Acknowledgement: We hereby acknowledge that the following additional work is required to meet the terms and conditions of the CEC-funded charging station installation project described herein, and that this work shall be conducted by the Site Host, at the Host's own expense, using the Host's own resources, contractors (if applicable), and personnel.

Scope of Work: _____

Proposed date to begin work: _____

Proposed date to complete work: _____

Authorized Signature: _____

Printed Name: _____

Title (Please Print): _____

Date: _____

ChargePoint Warranty Information

ChargePoint Master Software Services Agreement

APPROVAL TO PROCEED

The signatures below indicate agreement by all named parties with this Approval to Proceed with the installation of charging equipment and related services under the terms and conditions outlined in this document and in the Central Coast Charge Ahead Project grant application and award from the California Energy Commission.

Please note that this agreement is contingent upon and only goes into force after execution of all necessary agreements between the CEC and the California EV Alliance, and the subsequent execution of valid agreements between the California EV Alliance and ABM. If in the event that these superior agreements are not completed successfully with mutual consent between the parties, then ABM is not obligated to provide the equipment nor services identified in this agreement.

Site Host Authorized Signature

Printed Name & Title

Date

ABM Authorized Signature

Printed Name & Title

Date

Appendix B: Central Coast Charge Ahead Project Site Photographs

Total of 40 ChargePoint dual-port stations with 78 Level 2 ports installed at 25 sites

Figures 6 through 34 show charging stations throughout the Central Coast Charge Ahead Project locations.

Figure 6: City of Arroyo Grande – Amtrak Parking Lot



Source: EV Alliance

Figure 7: City of Paso Robles – Amtrak Parking Lot



Source: EV Alliance

Figure 8: Ventura City College – Parking Lot



Source: EV Alliance

Figure 9: City of Carpinteria – Public Parking Lot



Source: EV Alliance

Figure 10: City of Carpinteria – Downtown Parking Lot



Source: EV Alliance

Figure 11: City of Carpinteria – Amtrak and Beach Parking Lot



Source: EV Alliance

Figure 12: City of Carpinteria – City Hall



Source: EV Alliance

Figure 13: City of Camarillo – Decker Outdoor Corporation



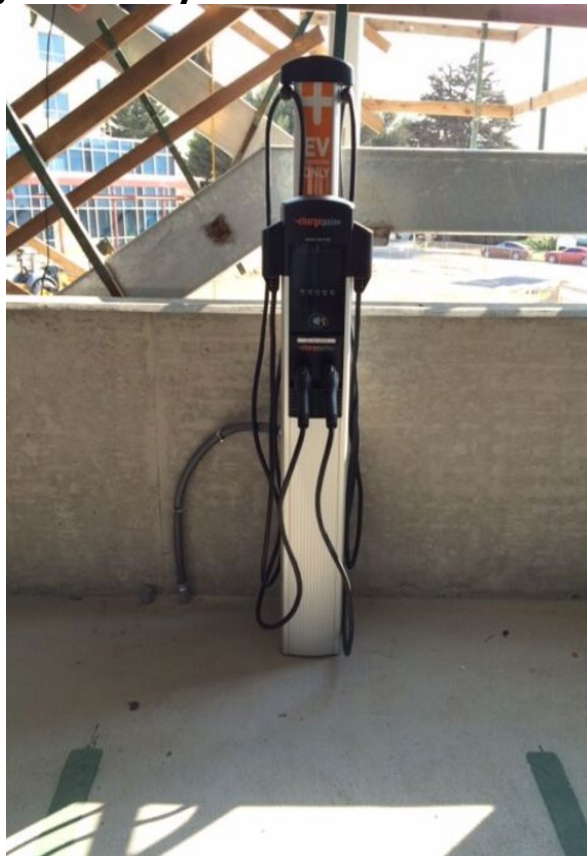
Source: EV Alliance

Figure 14: City of Ventura – Community Park and Aquatics Center



Source: EV Alliance

Figure 15: City of Ventura – Beach Parking



Source: EV Alliance

Figure 16: City of Ventura – City Parking #4



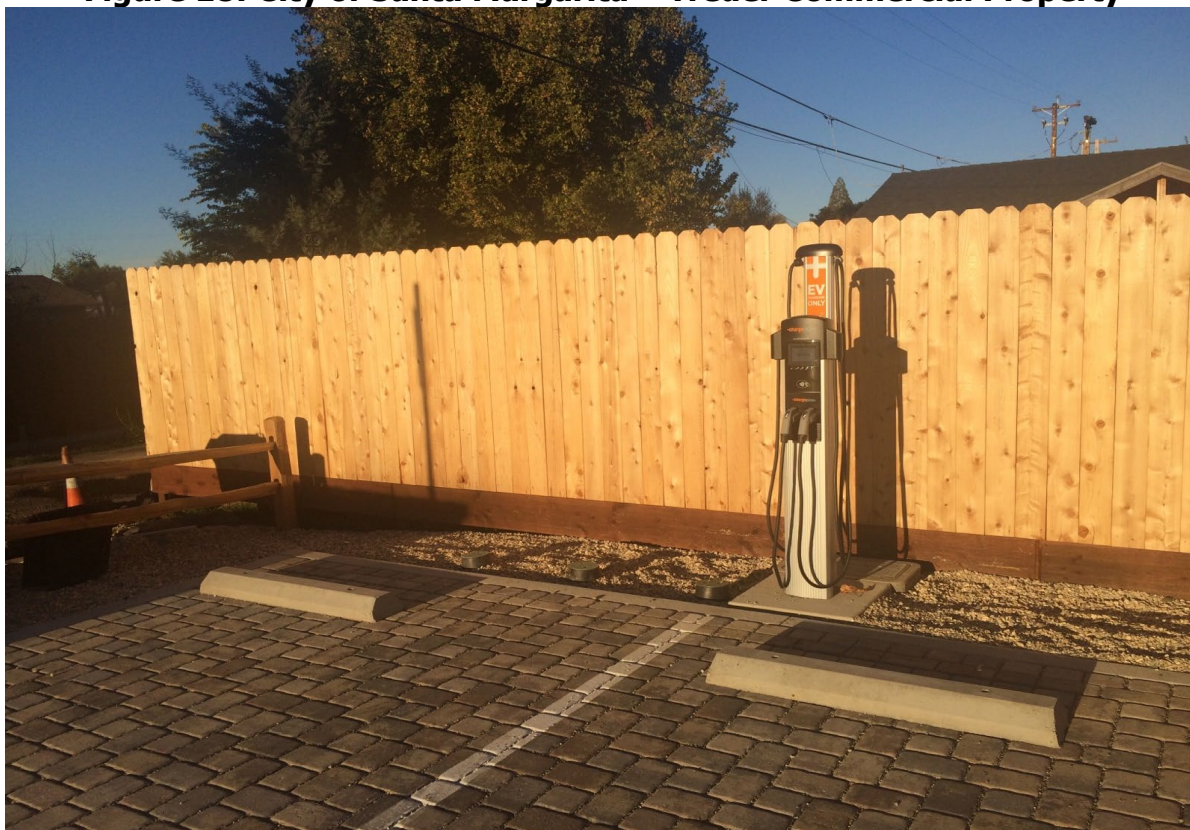
Source: EV Alliance

Figure 17: City of Ventura – Community Hospital



Source: EV Alliance

Figure 18: City of Santa Margarita – Treder Commercial Property



Source: EV Alliance

Figure 19: County of Ventura Government Center



Source: EV Alliance

Figure 20: County of Ventura – East County Courthouse



Source: EV Alliance

Figure 21: County of Ventura – County Services Center, Williams Drive



Source: EV Alliance

Figure 22: County of Ventura – County Services Building, Vanguard Drive



Source: EV Alliance

Figure 23: County of Ventura – Todd Road Jail



Source: EV Alliance

Figure 24: County of Ventura – Government Center & Juvenile Justice Complex



Source: EV Alliance

Figure 25: County of Santa Barbara – Isla Vista Solar Lot



Source: EV Alliance

Figure 26: County of Santa Barbara – County Jail



Source: EV Alliance

Figure 27: City of Buellton – City Hall



Source: EV Alliance

Figure 28: City of Ventura – Moorpark College



Source: EV Alliance